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Nuclear LLC

JUL 03 2014

LR-N14-0152

10 CFR 50.73

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

LER 272/2014-004-00
Salem Nuclear Generating Station Unit 1
Renewed Facility Operating License No. DPR-70
NRC Docket No. 50-272

SUBJECT: Reactor Trip Due to Actuation of Generator Protection

The Licensee Event Report, "Reactor Trip Due to Actuation of Generator Protection" is being submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A), as an "...event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)..."

The attached LER contains no commitments. Should you have any questions or comments regarding the submittal, please contact David Lafleur of Salem Regulatory Assurance at 856-339-1754.

Sincerely,

John F. Perry
Site Vice President – Salem

Attachments (1)

10 CFR 50.73

cc Mr. W. Dean, Administrator – Region 1, NRC
Mr. J. Lamb, Licensing Project Manager – Salem, NRC
Mr. P. Finney, USNRC Senior Resident Inspector, Salem (X24)
Mr. P. Mulligan, Manager IV, NJBNE
Mr. T. Joyce, President and Chief Nuclear Officer – Nuclear
Mr. T. Cachaza, Salem Commitment Tracking Coordinator
Mr. L. Marabella, Corporate Commitment Tracking Coordinator
Mr. D. Lafleur, Salem Regulatory Assurance

NRC FORM 366 (01-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 01/31/2017

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

# LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. PAGE |
|---|---|---|
| Salem Generating Station – Unit 1 | 05000272 | 1 OF 3 |

**4. TITLE** Reactor Trip Due to Actuation of Generator Protection

| 5. EVENT DATE | | | 6. LER NUMBER | | | 7. REPORT DATE | | | 8. OTHER FACILITIES INVOLVED | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO. | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER 05000 |
| 05 | 07 | 2014 | 2014 | - 004 | - 000 | 07 | 03 | 2014 | FACILITY NAME | DOCKET NUMBER 05000 |

| 9. OPERATING MODE | 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) | | | |
|---|---|---|---|---|
| 1 | ☐ 20.2201(b) | ☐ 20.2203(a)(3)(i) | ☐ 50.73(a)(2)(i)(C) | ☐ 50.73(a)(2)(vii) |
| | ☐ 20.2201(d) | ☐ 20.2203(a)(3)(ii) | ☐ 50.73(a)(2)(ii)(A) | ☐ 50.73(a)(2)(viii)(A) |
| **10. POWER LEVEL** | ☐ 20.2203(a)(1) | ☐ 20.2203(a)(4) | ☐ 50.73(a)(2)(ii)(B) | ☐ 50.73(a)(2)(viii)(B) |
| | ☐ 20.2203(a)(2)(i) | ☐ 50.36(c)(1)(i)(A) | ☐ 50.73(a)(2)(iii) | ☐ 50.73(a)(2)(ix)(A) |
| 97% | ☐ 20.2203(a)(2)(ii) | ☐ 50.36(c)(1)(ii)(A) | ☒ 50.73(a)(2)(iv)(A) | ☐ 50.73(a)(2)(x) |
| | ☐ 20.2203(a)(2)(iii) | ☐ 50.36(c)(2) | ☐ 50.73(a)(2)(v)(A) | ☐ 73.71(a)(4) |
| | ☐ 20.2203(a)(2)(iv) | ☐ 50.46(a)(3)(ii) | ☐ 50.73(a)(2)(v)(B) | ☐ 73.71(a)(5) |
| | ☐ 20.2203(a)(2)(v) | ☐ 50.73(a)(2)(i)(A) | ☐ 50.73(a)(2)(v)(C) | ☐ OTHER |
| | ☐ 20.2203(a)(2)(vi) | ☐ 50.73(a)(2)(i)(B) | ☐ 50.73(a)(2)(v)(D) | Specify in Abstract below or in NRC Form 366A |

**12. LICENSEE CONTACT FOR THIS LER**

| FACILITY NAME | TELEPHONE NUMER (Include Area Code) |
|---|---|
| David Lafleur, Senior Compliance Engineer, Salem Regulatory Assurance | (856) 339-1754 |

**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|
| B | EL | XCT | W120 | Yes | | | | | |

| 14. SUPPLEMENTAL REPORT EXPECTED | 15. EXPECTED SUBMISSION DATE | MONTH | DAY | YEAR |
|---|---|---|---|---|
| ☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO | | | | |


ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 7, 2014 at 0456, Salem Unit 1 experienced an automatic reactor trip. The direct cause of the reactor trip was a generator lockout resulting from a main generator differential relay trip. All control rods fully inserted on the trip. All three Auxiliary Feedwater (AFW) pumps started as expected in response to low steam generator levels and decay heat was removed by the steam dumps to the main condenser. Operators entered the emergency procedures for the plant trip and stabilized the plant in Mode 3 (HOT STANDBY).

The Main Generator Differential Relay tripped due to a failed wiring termination on the A Phase Neutral Generator Current Transformer (CT). The failed wiring termination was repaired.

This report is made in accordance with 10 CFR 50.73 (a)(2)(iv)(A), "...any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)..." due to an automatic reactor trip and actuation of the AFW system.

## PLANT AND SYSTEM IDENTIFICATION

Westinghouse - Pressurized Water Reactor (PWR/4)

Main Generator {EL/-}

## IDENTIFICATION OF OCCURRENCE

Event Date: May 7, 2014

Discovery Date: May 7, 2014

## CONDITIONS PRIOR TO OCCURRENCE

Salem Unit 1 was in operational Mode 1, steady-state, operating at 97 percent rated thermal power. No additional structures, systems or components were inoperable at the time of discovery that contributed to this event.

## DESCRIPTION OF OCCURRENCE

On May 7, 2014 at 0456, Salem Unit 1 experienced a reactor trip due to a generator lockout resulting from a main generator differential relay trip. Generator protection lockout circuitry tripped the generator and turbine which tripped the reactor.

All control rods fully inserted on the trip. All three AFW pumps started as expected in response to low SG levels and decay heat was removed by the steam dumps to the main condenser. Operators entered the emergency procedures for the plant trip and stabilized the plant in Mode 3 (HOT STANDBY).

## CAUSE OF OCCURRENCE

A failed wiring termination on the Unit 1, A Phase Neutral Generator CT {EL/XCT} caused the Generator Differential Trip to occur. A root cause investigation was performed to address this and the previous generator CT connection failure event on April 13, 2014. The root cause was determined to be an improper termination of the CT lead wire to field wire connection. A contributing cause was that the extent of condition visual examination and testing to identify potential common mode failures was not adequately challenged by the station. Failure analysis determined that the CT connection insulating tape failed due to chronic thermal fatigue permitting moisture intrusion due to inadequate environmental controls. The Salem Unit 2 generator is a different, General Electric (GE) manufactured design which is exposed to lower

operating temperatures and has a different CT termination design.

## PREVIOUS OCCURRENCES

A review of Licensee Event Reports at Salem Station going back to 2001 identified two other similar events:

LER 272/2001-006-00, "Reactor Trip Due to a Degraded Termination On Phase "A" Neutral Current Transformer Field Wiring" describes a degraded wire termination associated with the "A" Phase Main Generator Neutral CT as well as degradation of the CT itself, occurring on May 22, 2001. The affected field wiring was replaced and the CT was abandoned in place.

LER 272/2014-003-00, "Reactor Trip Due to Actuation of Generator Protection" describes a generator lockout event on April 13, 2014, due to a failed wiring termination on the C Phase neutral generator current transformer. The wire termination was repaired.

## SAFETY CONSEQUENCES AND IMPLICATIONS

There were no safety consequences associated with this event. Operators appropriately responded to the reactor trip to stabilize the plant. All plant safety systems operated as required.

A review of this event determined that a Safety System Functional Failure (SSFF) as defined in Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment Performance Indicator Guideline, did not occur.

## CORRECTIVE ACTIONS

1. All Unit 1 main generator CT field wires and terminations on all 18 CTs were replaced.
2. All Unit 1 main generator line and neutral CTs were tested. All testing results were satisfactory.
3. A preventative maintenance task will be implemented to periodically inspect and test all Unit 1 main generator CT connections.
4. The procedure governing cable termination methods will be changed to provide specific guidance for Unit 1 CT lead and field wire terminations.
5. Leadership training will be provided for improvement to equipment reliability technical conscience and proper review/challenge of equipment issues.

## COMMITMENTS

No commitments are made in this LER.